FACT SHEET FOR NPDES PERMIT NO. WA-005209-4

LAKE WENATCHEE PUBLICLY-OWNED TREATMENT WORKS

SUMMARY

Chelan County Pubic Utility District No. 1 is seeking reissuance of the NPDES Permit for its Lake Wenatchee Public-Owned Treatment Works. The entire facility is within the boundaries of the Wenatchee National Forest. The facility collects and treats wastewater from private residences, a few commercial businesses, public and private campgrounds, and a U. S. Forest Service ranger station located around the eastern end of Lake Wenatchee.

Treated effluent is discharged to the Class AA waters of the Wenatchee River only during cold weather months (approximately November through April). During warmer months (approximately May through October), effluent is applied to an adjacent 21.5 acre sprayfield site of which 13 acres are irrigated for tertiary treatment.

The collection and treatment system is a Septic Tank Effluent Pumped (STEP) system; primary-level treatment of wastewater occurs in onsite septic tanks and is then conveyed to the main treatment plant through pressurized sewer lines. Secondary-level treatment occurs via a facultative lagoon. During cold weather months, wastewater receives tertiary-level treatment through the use of a recirculating sand filter, and polishing tank. The effluent is then discharged to the Class AA Wenatchee River.

The Permittee's record of compliance was excellent during the previous permit cycle. The facility easily complies with the very high standard of performance required of a discharger to Class AA receiving waters.

Facility expansion was completed in 2003 which increased the capacity of the re-circulating sand filter system. This project has increased the existing design capacity, which according to current growth projections is adequate for the next ten years. The Permittee has also installed a UV disinfection system for winter effluent.

TABLE OF CONTENTS

INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the State of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the State is allowed.

The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	Chelan County Public Utility District #1
Facility Name and Address	Lake Wenatchee Public-Owned Treatment Works 21251 State Route 209 Leavenworth, WA 98826
Type of Treatment: Summer	Septic tanks followed by a facultative lagoon, achieving secondary treatment before discharge to sprayfields and subsequent recharge to groundwater.
Type of Treatment: Winter	Septic tanks followed by a recirculating filter and a polishing tank, achieving advanced wastewater treatment standards before discharge to the Wenatchee River.
Discharge Location: Summer	Sprayfield Section 27, Township 27 N, Range 17 E. W. M.
Discharge Location: Winter	Wenatchee River, River Mile 53.6 Latitude: 47° 48' 37" N Longitude: 120° 42' 47" W.
Water Body ID Number	WA-45-1020

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

History

The Permittee has increased the size of the recirculating sand filter and added new programmable logic controllers, added UV disinfection and installed a new recycle tank.

Collection System Status

When the Chelan County PUD No. 1 assumed responsibility in 1993 new preliminary treatment facilities were constructed, which included multiple septic tanks installed on properties within the service area, each equipped with an effluent screen and pump. The new north-shore and south-shore collection systems were constructed as small diameter pressure sewers, equipped with vacuum/air relief valves. Both discharge through a common pressure regulation valve at the central treatment facility. This combination of preliminary treatment in septic tanks, a pressurized sewer system and secondary-level wastewater treatment at a central facility is commonly referred to as a STEP system. The septic tank effluent flow is capable of being directed to either a recirculating filter (during the winter) or lagoon (during the summer).

Treatment Processes at Main Treatment Plant

1. Winter Operation (September 1 through April 30)

STEP system effluent is directed to the central facility, where it is mixed with treated, but non-disinfected, recirculating filter effluent in a recirculation tank (completed in 1993). The recirculating filter is comprised of fine gravel covered by a layer of coarse gravel in plastic-lined basins. Wastewater distribution piping is in the upper part of the gravel and effluent collection piping is on the bottom of the basins. The treated wastewater collected by the underdrain system flows through a splitter box with a fixed ratio of 5:1 (treated wastewater to STEP system effluent). Treated wastewater that is not returned to the initial recirculation tank, flows through the U.V. disinfection chamber to the polishing tank. The facility maintains chlorination as backup to UV disinfection. Polishing tank effluent is subsequently discharged to the Wenatchee River through the same outfall as was used by the U.S.F.S. treatment facility.

2. Summer Operation (May through October)

Septic tank effluent is directed to a lagoon (facultative/aerated) which has been partitioned into four cells, two small and two large. The influent enters one of the small cells, flows into the second small cell, and then through the final large cells. Treated effluent is chlorine disinfected and then pumped to a 21.5-acre sprayfield of which 13 acres are irrigated. The sprayfield is located on a wooded terrace above the flood plain of the Wenatchee River and is fenced, with a setback of 200 feet. The site meets the requirements for restriction of public access for use with Class D reclaimed wastewater. Monitoring wells were situated to provide both upgradient, site-specific, and downgradient groundwater samples. The wells were drilled and cased in 1992, but were not completed until the spring of 1993.

Discharge Outfall

Treated and disinfected effluent is discharged from the facility via an outfall to the Wenatchee River, approximately 25 feet downstream of the Highway 207 bridge, and just downstream of the confluence of Nason Creek with the Wenatchee River. The outfall structure consists of a 6-inch PVC pipe on top of a concrete diversion structure which is covered by a screen to prevent obstruction of the outfall pipe. The diversion structure increases turbulence in the immediate vicinity of the outfall, which enhances effluent dispersion. The discharge is at right angles to the flow of the river, which itself is approximately 120 feet wide and no more than two feet deep during "low flow conditions", with a bed of coarse gravel.

Residual Solids

The facility's STEP, system has very little residual solids to contend with at the plant location. Individual septic tanks are service by a licensed septic pumping service. Solids buildup at the plant is extremely slow because the septic tanks handle the bulk of residual solids such as grits, rags, sludge, etc.

Industrial Users

According to the permit application provided by the Permittee, there are no industrial contributors to the Permittee's sewer collection system.

PERMIT STATUS

An application for permit renewal was received by the Department on July 9, 2004 and accepted by the Department on July 22, 2004.

The existing permit for this facility was issued on May 16, 2000. The previous permit placed effluent limitations on 5-day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH, Fecal Coliform Bacteria, Ammonia and Residual Chlorine.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

A compliance inspection without sampling was conducted on July 30, 2004. All aspects of the facility that were inspected were found to be satisfactory.

During the history of the previous permit, the Permittee has remained in compliance, based on DMRs submitted to the Department and inspections conducted by the Department.

WASTEWATER CHARACTERIZATION

This section of the fact sheet contains data and brief analyses of treatment plant influent and effluent for the period January 2003 to June 2004. Because the treatment plant operates in two very different configurations, summer and winter, influent data are characterized according to season and compared to the appropriate design criteria. Effluent data was also characterized seasonally, but are compared to effluent limits contained in the previous permit, which contain separate limits for discharge to the river and discharge to ground water.

Influent

The concentration of pollutants in the influent was reported in DMRs submitted to the Department as a requirement of the previous permit. The treatment plant operates in two configurations and has two sets of design criteria; therefore, influent characteristics are compared

to design criteria on a seasonal basis. Design criteria were taken from the Assessment of Flow and Wasteload dated July 29, 2004.

1. Summer (May through October)

During the summer season treatment occurs in the lagoon system and sprayfield; therefore, loadings to each treatment process and comparison to design criteria are presented separately in the tables below.

a. Lagoon

Design criteria for organic and hydraulic lagoon loadings are expressed in terms of *pounds per day* (lbs/day) or *million gallons per day* (MGD), respectively. Values in the percent of design criteria column reflect the average monthly value from May 2003 to June 2004 for the parameter in the preceding column, expressed in lbs/day or MGD, as a percentage of the summer design criteria.

Influent Characterization and Comparison to Lagoon Summer Design Criteria

Parameter	Units	Summer Average from May 2003 to June 2004 [1]		Maximum Monthly Average	
		Value	% of Design Criteria	Value	% of Design Criteria
Ammonia	mg/L as N	8.5	N/A	24.2	N/A
BOD_5	mg/L	98.6	N/A	136.5	N/A
BOD_5	lbs/day	13.5	21.4	36.7	58.3%
Flow	MGD	0.023	44.2	0.038	73%
TSS	mg/L	13.1	N/A	31.6	N/A
TSS	lbs/day	2.6	9.3	13	46.4

[1] Summer means the period being May 1st and ending October 31st except for 2004 where data is not yet available.

b. Sprayfield

The Assessment of Flow and Wasteload dated July 29, 2004.
expresses sprayfield design criteria in terms of total pounds of organic loading and total million gallons of hydraulic loading *over the summer season.*

Influent Characterization and Comparison to Sprayfield Summer Design Criteria For the 2003 Season

Parameter	Units	Seasonal Totals	
		Value	% of Design
Soluble BOD_5	lbs	238.9	13.5 [1]
Flow	MG	5.018	53.8
TKN	lbs	325	20.8

[1] Calculation of the percent of the Sol BOD per Day limit: 238.9 lbs Sol BOD/ 214 days in season = 1.116 lbs Sol BOD per Day. 1.116lbs Sol BOD per Day/8.3 lbs Sol BOD per Day limit = 13.5%

2. Winter (November 2003 through April 2004)

Influent Characterization and Comparison to the POTW Design Criteria

Parameter	Units	Seasonal Average Winter		Maximum Monthly Average	
		Value	% of Design	Value	% of Design
Ammonia	mg/L as N	39.8	N/A	45.3	N/A
BOD_5	mg/L	101.5	N/A	127	N/A
BOD_5	lbs/day	11.8	20.2	13.5	23.1
Flow	MGD	0.016	34.3	0.021	45
TSS	mg/L	10.5	N/A	12.1	N/A
TSS	lbs/day	1.2	5.1	1.6	6.8

Effluent

The concentration of pollutants in the effluent was reported in DMRs submitted to the Department.

1. Sprayfield Discharge Summer (April 2003 through October 2003)

Data presented in the table below reflect discharges from the lagoon system to the sprayfield. Parameters with monthly and weekly limits are summarized in the table. Additional parameters are summarized in the narrative following the table.

Seasonal average values summarize average monthly data submitted on DMRs. Maximum/minimum values are the single highest weekly average values for parameters

limited on a weekly basis or the single highest daily value for those limited with daily limits.

Effluent Characterization to Sprayfield with Comparison to the Effluent Limitations of the Previous Permit

Parameter	Units	Seasonal Average		Maximum/Minimum	
		Value	% of Permit Limit	Value	% of Permit Limit
Flow Daily	MGD	0.023	44.2 [1]	0.039 (max.)	75 [1]
Flow Season	Million Gallons	4.81	36.7	N/A	N/A
Soluble BOD_5	mg/L	5.7	28.5 [2]	9.0 (max.)	30 [2]
Soluble BOD_5	lbs/day	1.47	17.7 [2]	1.8 (max.)	21.7 [2]
Dissolved Oxygen	mg/L	5.97	N/A	4.66 (min)	N/A
Total Coliform Bacteria	# colonies/100 ml	N/A	N/A	74 (max.)	N/A
Total Residual Chlorine	mg/L	2.43	N/A	1.65 (min)	N/A
Ph	Standard Units	N/A	N/A	7.7 (max.); 6.6 (min.)	N/A
Total Kjeldahl Nitrogen	mg/L	6.36	N/A	9.5	N/A
Total Kjeldahl Nitrogen	lbs/month	333	15.2	N/A	N/A
TSS	mg/L	33.2	55.3	92 (max.) [3]	153.3
TSS	lbs/day	8.35	44.4 [4]	16.7 (max)	88.8

[1] Limit is Design Criteria of 0.052 MGD

[2] Average Monthly Limit mg/L = 20mg BOD /L and 8.3 lbs BOD/Day

[3] Maximum Monthly Average for April 2003

[4] TSS Maximum Loading 18.8 lbs TSS/Day

2. River Discharge Winter (November 2003 through April 2004)

River discharges of BOD_5, TSS and ammonia are limited by the previous permit in terms of concentration *and* mass loading. Data presented in the table below consider concentration and mass loading limits separately; therefore, for each of these three parameters percent of permit limits may be different values.

Discharges to the Wenatchee River were addressed in the previous permit with monthly average and daily maximum limits. In the table below, seasonal average values reflect monthly averages, and maximum/minimum values reflect the single highest pollutant levels reported for any single sampling event.

Effluent Characterization with Comparison to the Effluent Limitations in the Previous Permit

Parameter	Units	Seasonal Average		Maximum/Minimum	
		Value	% of Permit Limit	Value	% of Permit Limit
Flow	MGD	0.017	N/A	0.046 (max.)	N/A
BOD_5	mg/L	1.59	15.9	4.4 (max.)	44
Temp	º C	6.69	N/A	11.3 (max.)	N/A
BOD_5	lbs/day	0.23	14.3	1.19 (max.)	74
Total Coliform Bacteria	# colonies/100 ml	N/A	N/A	68 (max.)	N/A
pH	Standard Units	N/A	N/A	7.4(max.) 6.4 (min.)	N/A
Ammonia (NH_3-N)	mg/L as N	1.07	15.3	5.5	78.6
Ammonia (NH_3-N)	lbs/day as N	0.23	14.3	0.95	86
TSS	mg/L	1.33	13.3	2.5	25
TSS	lbs/day	0.25	15.6	0.676	61
Total Phosphorous	mg/L	4	N/A	5	N/A

DESCRIPTION OF THE RECEIVING WATER

The facility discharges to the Wenatchee River, River Mile 53.6, which is designated as a Class AA receiving water in the vicinity of the outfall. The river is located within the Wenatchee National Forest and, consequently, is designated as an "outstanding resource water."

Characteristic uses include the following:

> Water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses. The following stringent narrative and numeric receiving water quality criteria apply to the river:

Dissolved Oxygen:	Shall exceed 9.5 mg/L
Temperature:	Shall not exceed 16.0° C due to human activities; maximum increase in temperature shall not exceed 0.3° C when ambient exceeds 16.0° C.
pH:	Shall be in the range of 6.5 to 8.5 with a human-caused variation of less than 0.2 S. U.'s.

Fecal Coliform: Shall not exceed a geometric mean value of 50 organisms/100 mL, with not more than 10 percent of all samples exceeding 100 organisms/100 mL.

Turbidity: Shall not exceed 5 NTU's over ambient when background turbidity is less than 50 NTU's, or have more than a 10 percent increase in turbidity when the ambient is above 50 NTU's.

The previous permit required monitoring of the river from November through April annually.

The Permittee was required to test the receiving water for the following parameters: Flow, Dissolved Oxygen, pH, Temperature, Ammonia, Alkalinity, and Hardness. An Amended Engineering Report, dated February 1997, contains a summary of receiving water data collected from January 1995 through April 1996. The table below is a reproduction of the table in the ER summary:

River Water Quality Statistics
(January 2000-April 2004 Winter Discharge Period)

Parameter	Number of Samples	Minimum	Maximum	Median	Average	Critical 10th % or 90th %
Temperature, in °C	103	2.5	10	4.8	5.12	7.1
pH	76	5.4 [1]	7.3	6.9	6.8	7.2
Total Ammonia, in mg/L-N	45	0.0	0.26	0.0	0.02	0.04
Dissolved Oxygen, in mg/L	107	9.7	13.0	11.3	11.25	12.04
Total Phosphorous *	24	.002	.0075	.003	.0037	.0074

[1] Occurred in November 2001.
* EAP data from 2001 through September 2004

The averaged data verifies that the receiving water is within the water quality criteria described above. The Wenatchee River at this location periodically experiences pH values below 6.5 that may be attributable to higher than normal rainfall events coupled with a watershed has a history of mining dating back to the beginning of the twentieth century. There have been 12 low pH excursions out of the 76 monitored in the last four years. Ten of these occurred in 2001, a year of higher than normal rainfall. With this in mind the writer believes the average pH values reflect a more accurate assessment of the ambient river conditions.

PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards

(Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

DESIGN CRITERIA

In accordance with WAC 173-220-130(1)(a), effluent limitations shall not be less stringent than those based upon the design criteria for the facility, which are contained in approved engineering plans, reports, or approved revisions. Also, in accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The 1997 Upgrade Plans and Specifications Engineering Report was drafted in response to the need to increase capacity following an agreement with the Washington State Parks. In the agreement, the Permittee agrees to treat wastewater generated at the Lake Wenatchee State Park. Following completion of the upgrade in 2003 and in the following Plan for Maintaining Capacity dated (PMAC) July 29th, 2004 the following design criteria are listed.

A. Central Treatment Facility (Septic tank effluent):

Hydraulic loading has been estimated at 60 gallons per day per capita, which assumes no infiltration and moderately conservative water usage during the peak summer usage months. Effluent characteristics are typical for resorts and residences at BOD = 150 mg/L and TSS = 60 mg/L. The expected composition of the wastewater discharged from septic tanks in fairly constant use, and received at the central facility, is not expected to vary significantly. However, for those properties used intermittently, septic tank effluent will be expected to be markedly variable.

B. Recirculating Filter (winter only):

The pre-upgrade design capacities were as follows:

Monthly average flow (max. month):	0.0190 MGD
Peak hourly effluent flow:	0.0038 MG/hour
BOD influent loading:	23.8 lbs/day
TSS influent loading:	9.4 lbs/day
Nitrogen:	8.0 lbs/day

The current design capacities are as follows:

Monthly average flow (max. month):	0.0467 MGD
Peak hourly effluent flow:	0.0793 MG/hour
BOD influent loading:	58.4 lbs/day
TSS influent loading:	23.4 lbs/day
Influent Ammonia Nitrogen:	19.5 lbs/day

C. Facultative Lagoon (Summer only):

The lagoon loadings are expressed as monthly averages. The previous design capacities are as follows:

Monthly average flow (max. month):	0.050 MGD
BOD influent loading:	63.0 lbs/day
TSS influent loading:	25.0 lbs/day

The lagoon loadings are expressed as monthly averages. The current design capacities are as follows:

Monthly average flow (max. month):	0.052 MGD
BOD influent loading:	65.0 lbs/day
TSS influent loading:	26.0 lbs/day

D. Sprayfield (May through October only):

The design capacities for the sprayfield are limiting and are based on annual loadings of the sprayfield. This permit requires continued performance analysis of the sprayfield, which could result in a revision of the present design capacities. The design capacities are as follows:

Peak seasonal flow:	9.335 MG per season
Peak Monthly flow:	3.05 MG per month
Total Nitrogen loading:	1,560. lbs/Year

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by Federal and State regulations. These effluent limitations are given in the 40 CFR Part 133 (Federal) and in Chapter 173-221 WAC (State).

These regulations are performance standards that constitute "all known available and reasonable methods of prevention, control, and treatment" (AKART) for municipal wastewater. For dischargers to rivers within National Forests, such as the Lake Wenatchee POTW, Advanced Wastewater Treatment Guidelines have also been established by the Department. Additionally, effluent limitations shall not be less stringent than those based upon the treatment facility design efficiency contained in approved engineering plans and reports.

Winter Discharge to the Wenatchee River

The following technology-based limits are derived from Chapter 173-221 WAC and approved engineering plans and reports.

These effluent limits pertain only to the *winter discharges* to the Wenatchee River:

BOD_5 and TSS: Daily Maximum limit is the more stringent of the following:
- 10 mg/L
- may not exceed five percent (5%) of the average influent concentration, except for STEP* systems.

* The Permittee will be presumed to be in compliance with the percent removal requirement in this permit if the permit effluent concentration limits are met and neither USEPA criteria (120 gallons per capita per day for the highest 7-14 day average, and 275 gallons per capita per day for the highest 24-hour average) are exceeded. If either of the USEPA criteria are exceeded, the Permittee will be required to implement a rehabilitation program to reduce infiltration and inflow (I&I). The program will be agreed upon between the Department and the Permittee and the details (schedule, work plan, financial commitment) will be incorporated into an consent order.

BOD_5 and TSS: Daily Maximum effluent mass loading limit =
[10 mg/L X 8.34 X 0.0467 MGD] = 3.9 lbs/day

Fecal Coliform Bacteria:

Monthly Average- shall not exceed a geometric mean of 50 organisms/100 ml.
Daily Maximum = 230 organisms/100ml.

pH: Between 6.5 and 8.5 at all times.

Ammonia: Monthly Average = 7 mg N/L
Monthly Average effluent mass loading= [7mg/L X 8.34 X 0.0467 MGD] = 2.7 lbs/day

Daily Maximum Limit = 10 mg N/L
Daily Maximum effluent mass loading limit = [10 mg/L X 8.34 X 0.0467 MGD] = 3.9 lbs/day

Total Residual Chlorine: In the event of UV disinfection failure the backup chlorine disinfection system will be required not to exceed:

Daily Maximum limit = 0.5 mg/L

In light of the recently completed study of the 303d listed impaired waters of the State, Wenatchee River, and a pending Total and Maximum Daily Load (TMDL) allocation, the Permittee should be prepared for the possibility that future permits may establish performance-based ammonia limits that are substantially lower than the limits contained in this permit.

Phosphorous TMDL Considerations

The pending TMDL may also include wasteload allocations for Phosphorus at some time during the proposed permit cycle. This is in response to high pH values found at the confluence of the Wenatchee and Columbia Rivers. Phosphorous is a known limiting factor in plant growth, which has a direct effect on pH in the water column. At this time it is unknown whether a wasteload allocation for phosphorus will be imposed at the Permittee's facility. In anticipation that a wasteload allocation will be imposed sometime during the proposed permit term Special Conditions, S1.A. 2a and 2b, provisionally require the Permittee to meet a Schedule of Compliance for meeting an imposed wasteload allocation and to provide the Department with a Progress Report.

Summer Discharge to the Sprayfield

According to Chelan Co. PUD No. 1 Soil Report for Domestic Wastewater Sprayfield dated October 30, 2003:

> "Soils at the site are suited for accepting sprinkler applied wastewater. The site has ample area and suitable soil resources for such a system. A moderately limiting factor is low soil pH.
>
> No deleterious effects to soil or forest productivity are expected with current management practices. Application approach is consistent with accepted agronomic practice".

The following technology-based limits are based on: (1) "Water Reclamation and Reuse Interim Standards"; (2) "Design Criteria for Land Treatment Systems"; and (3) approved engineering plans and reports. These effluent limits pertain only to the *summer discharges* to the facility's sprayfield:

Flow:	Seasonal Maximum limit = 9.335 Million Gallons
Soluble BOD_5:	Monthly Average limit = 20 mg/L Weekly Average limit = 30 mg/L Monthly Average effluent mass loading= [20mg/L X 8.34 X 0.0520 MGD]= 8.67 lbs/day Weekly Average effluent mass loading= [30mg/L X 8.34 X 0.0520 MGD]= 13.0 lbs/day
TSS:	Monthly Average limit = 45 mg/L Weekly Average limit = 67.5 mg/L Monthly Average effluent mass loading= [45mg/L X 8.34 X 0.0520MGD] = 19.5 lbs/day Weekly Average effluent mass loading= [67.5mg/L X 8.34 X 0.0520MGD] = 29.3 lbs/day
Total Nitrogen:	Seasonal mass loading limit according to the 2004 PMAC = 1560 lbs/Season
Total Coliform Bacteria:	Weekly Average limit = < 200 colonies/mL

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a State regulation designed to protect the beneficial uses of the surface waters of the State. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The State was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

Antidegradation

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More

information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and has determined ambient water quality in general meets the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The one exception in the ambient pH levels, The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Mixing Zones

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Mixing Zone Authorization

Because of the reasonable potential for pollutants in the proposed discharge to exceed water quality criteria, mixing zones may be authorized for the surface water discharge (see reasonable potential determination, later in this fact sheet). These zones will accommodate the geometric configuration and flow restriction for mixing zones in Chapter 173-201A WAC and are defined as follows: "The chronic mixing zone shall extend downstream for three hundred (300) feet and upstream for twenty five (25) feet and shall extend thirty (30) feet across the river. The acute mixing zone shall extend downstream for 30 (30) feet and 2.5 feet upstream and shall extend three (3) feet across the river. The dilution factors of effluent to receiving water that occur within the acute and chronic mixing zones have been determined to be **43:1** and **214:1**, respectively".

Dilution Factor Determination

The present permit contains dilution factors and a “minimized” mixing zone that were derived when the previous permit was being written. At that time, chlorine was the limiting factor. The facility has since stopped using chlorine with the installation of a ultra-violet disinfection system and has increased effluent flow design criteria with the upgrade. Modeling of the dilution factors was conducted using four separate models; a simple mass balance equation, EPA’s Visual Plumes, the Department’s RIVPPLUM and Cormix for single-port diffusers. The permit writer was not able to recreate the dilution factors previously determined using RIVPLUM. It is clear one model does not fit all circumstances. EPA’s Visual Plumes 1.01 will not project dilution factors after predicting a plume reaches the surface of the water. For a river only 1.25 feet deep at critical flow, Visual Plumes is clearly not appropriate. RIVPLUM, while more appropriate for smaller rivers and streams, predicts a chronic dilution factor at a 122 million to one when the outfall extends 6.25 feet into the river. The writer suspects the original dilution factor determination was made using a sidebank discharge scenario in the model, which is clearly not the case. The Cormix single-port model in this instance generated the most restrictive dilution factor prescription using the proper alignment of the outfall with the river. The mixing zone dimensions are modified from the previous permit because modification of the dimensions will bring the results of the Cormix model more in line with the mass balance equation and in the opinion of the writer, false assumptions may have been made in determining the original dimensions. (see Appendix C for spreadsheet calculations)

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Surface Water Quality-Based Limits for "Numerical" Criteria

1. Surface water discharges (Winter only): Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants, whose adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

   The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water. Water quality-based limits are derived for the waterbody's "critical condition", which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota and existing or characteristic water body uses.

(A) Dissolved Oxygen and BOD: The impact of BOD on the receiving water was modeled using simple dilution techniques at "critical condition" and with the technology-based effluent limitation for BOD (10 mg/L). During this "critical condition" period, the model predicted the natural DO concentration in the receiving water would sometimes be lower than 9.5 mg/L. Under such conditions the surface water standards do not allow any further reduction caused by point source discharges. Therefore, the change-over from sprayfield to river discharge will be limited, at least, by the following two requirements: (1) the DO of the receiving water shall have been greater than 9.7 mg/L for three consecutive sampling days; and (2) the effluent DO shall continually be at least 2.8 mg/L before discharge to the river is begun each autumn. The Water Quality criterion can be met at the end of the mixing zone when the dissolved oxygen concentration in the receiving water remains in excess of 9.5 mg/L.

(B) Temperature and pH: Several times during "critical condition", the natural temperature of the Wenatchee River exceeds the water quality standards. The standards indicate that under these conditions the natural temperature becomes the water quality criterion for that part of the river and no temperature increase is allowed which will raise the receiving water temperature by more than 0.3° C. The impact of pH and temperature were modeled using the calculations from EPA, 1988. Using the dilution factor of **43:1** at the edge of the acute mixing zone, the facility could discharge wastewater well in excess of expected effluent temperatures without violation of the standards. It is known that at some times the natural river pH can drop below the water quality criterion of 6.5 but the average is within the criterion. Therefore, effluent limitations for pH are based on the surface water quality criteria established in173-201A-030 Class AA (extraordinary) were pH shall be within the range of 6.5 to 8.5 which are placed in this permit. No temperature limit is required. (See Appendix C)

(C) Fecal coliform: The numbers of Fecal coliform were modeled by simple mixing analysis. The technology-based limit was found to meet the Water Quality Standards. Under these conditions there is no predicted violation of the Water Quality Standards. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

(D) Toxic pollutants: Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the Water Quality Standards. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards or from having water quality-based effluent limits.

The Department has determined that the Permittee has only the toxic pollutant ammonia in its effluent. A determination of the reasonable potential of this pollutant to cause a violation of the Water Quality Standards is therefore required. However, this permit will still require monitoring both the final effluent discharged to the Wenatchee River and of the river itself for various parameters. These data will be used in future permits to conclude the reasonable potential for any pollutant, other than ammonia to cause toxicity in the receiving water.

(E) Reasonable Potential Determination: The reasonable potential determination for ammonia to exceed the water quality criteria were conducted using "critical condition" receiving water and waste discharge conditions. No reasonable potential to exceed the water quality criteria exists. The "critical condition" in this case typically occurs during September/October and data were used from historic data collected by the U.S.G.S. at the State Highway 207 Bridge. The parameters used in the "critical condition" modeling were as follows: 7Q10 flow of 183.7 cfs, river width at 7Q10 of 120 feet, river depth at 7Q10 of 1.25 feet, river flow at 7Q10 of 1.22 fps, acute dilution factor 43:1, chronic dilution factor 214:1, receiving water temperature 15.6°C, receiving water alkalinity 50.0 (as mg $CaCO_3$/L), and receiving water maximum ammonia of 0.260 mg/L. No ammonia limit is required.

Sediment Quality

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

COMPARISON OF EFFLUENT LIMITS WITH THE PREVIOUS PERMIT

Winter Discharge (to River)

Parameter	Previous Permit Limits		New Permit Limits	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
BOD_5	10 mg/L 1.6 lbs/day	10 mg/L 1.6 lbs/day	10 mg/L 3.9 lbs/day	10 mg/L 3.9 lbs/day
TSS	10 mg/L 1.6 lbs/day	10 mg/L 1.6 lbs/day	10 mg/L 3.9 lbs/day	10 mg/L 3.9 lbs/day
Fecal Coliform	50/100 mL	230/100 mL	50/100 mL	230/100 mL
Residual Chlorine	N/A	0.5 mg/L	N/A	N/A*
Total Ammonia	7 mg/L 1.1 lbs/day	10 mg/L 1.6 lbs/day	Not Required	Not Required
pH	6.3 to 8.7 standard units		6.5 to 8.5 standard units	

***** Chlorine is no longer used and has been replaced with UV disinfection.

Mass limitations reflect the increased flow criteria and do not constitute a relaxation in the permit limitations.

Summer Discharge (to Sprayfield)

Parameter	Previous Permit Limits		New Permit Limits	
	Monthly Average	**Weekly Average**	**Monthly Average**	**Weekly Average**
Soluble BOD_5	20 mg/L 8.3 lbs/day	30 mg/L 12.5 lbs/day	20 mg/L 8.67 lbs/day	30 mg/L 13.0 lbs/day
TSS	45 mg/L 18.8 lbs/day	67.5 mg/L 28.1 lbs/day	45 mg/L 19.5 lbs/day	67.5 mg/L 29.3 lbs/day
Total Coliform	N/A	240/100 mL	N/A	240/100 mL
Total Residual Chlorine	N/A	1.0 mg/L	N/A	1.0 mg/L
pH	6 to 9 standard units		6 to 9 standard units	
	Monthly Average	**Seasonal Maximum**	**Monthly Average**	**Seasonal Maximum**
TKN	N/A	2185 lbs	N/A	N/A
Total Nitrogen	N/A	N/A	N/A	1560 lbs
Total Flow	0.05 MGD	13.1 MG	3.05 MG	9.355 MG

GROUND WATER QUALITY LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's ground waters, including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. Drinking water is the beneficial use generally requiring the highest quality of ground water. Providing protection to the level of drinking water standards is considered sufficient to protect existing and future beneficial uses.

The intent of the standards is not to allow degradation of ground water up to the standards, but rather to protect background water quality to the extent practical. The antidegradation policy mandates the protection of background water quality and prevents degradation of water quality which would harm a beneficial use or violate the Ground Water Quality Standards.
Applicable ground water criteria as defined in chapter 173-200 WAC and in RCW 90.48.520 for this discharge include the following:

Ground Water Quality Criteria

Total Coliform Bacteria	1 Colony/ 100 mL
Total Dissolved Solids	500 mg/L
Chloride	250 mg/L
Sulfate	250 mg/L
Nitrate	10 mg/L
pH	6.5 to 8.5 standard units
Manganese	0.05 mg/L
Total Iron	0.3 mg/L
Toxics	No toxics in toxic amounts

Monitoring Wells

Monitoring Well #1(MW1) is located approximately 150 feet southeast and upgradient of the lagoon. It is used to monitor upgradient, or background, ground water quality conditions.

Monitoring Well #2(MW2) is located approximately 400 feet northeast of the lagoon in the northeast quadrant of the sprayfield.

SW#1 is located approximately 150 feet in the same northeast of the lagoon and is adjacent to the southwest edge of the sprayfield.

Background Conditions Found in Upgradient Monitoring Well #1
Data Collected from May 1993 through July 2004

Parameter	Range	Mean Value	Standard Deviation
Chloride (mg/L)	.025-2.7	1.04	0.68
Nitrate-N (mg/L)	.035-4.77	0.52	0.72
TDS (mg/L)	16-220	65.7	37.1
Sulfate (mg/L)	0.5-34.5	5.02	5.6

A statistical analysis was conducted to determine permit limits for NO_3-N and TDS. At Monitoring Well #1, a total of 36 NO_3-N and 37 TDS monthly analyses have been obtained beginning in May 1993. The data were examined using the procedures contained in the

Implementation Guidance for the Ground Water Standards (Ecology Publication 96-02, April 1996). This examination included tests for seasonality, normality and for outliers. The examination resulted in the determination that the data for both NO_3-N and TDS are log normally distributed and that a parametric analysis could be used to calculate an upper tolerance interval for each parameter. The upper tolerance interval constitutes the permit limit. A parametric analysis to calculate the upper tolerance interval utilizes the sample mean, the sample standard deviation, and a constant (K value) based on the sample size. These values are combined in the following way:

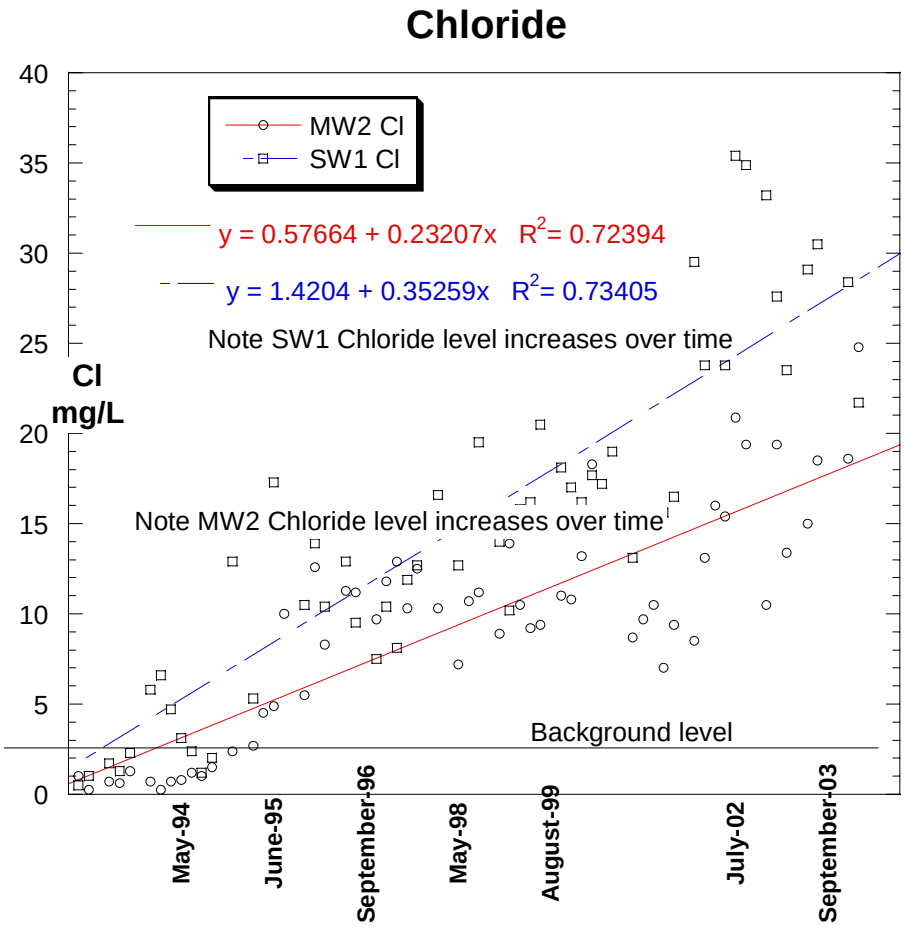
Permit Limit = Sample mean + Sample Standard Deviation times K Value

The permit limits of 4.7 mg/L NO_3-N and 195.5 mg/L for TDS result from this calculation.

An exceedance is defined as two successive months of NO_3-N or TDS analyses above the permit limit in any downgradient ground water monitoring well. In the event of an exceedance, the permit will require the Permittee to notify the department, resample the well, and prepare a report that documents the exceedance and discusses the steps to be used to achieve compliance.

Chloride Trends

Chloride levels found at monitoring wells MW2 and SW 1 have increased above the MW1 background concentration over time. These increases are still well below the groundwater criterion of 250 mg/L for chloride with an average of 9.6 mg/L and a maximum of 24.8 mg/L at MW1 and at MW2 with an average of 15.1 mg/L and a maximum of 35 mg/L.



The chloride concentration in the effluent has a mean of 65 mg chloride/L with a standard deviation of 17 mg. If the only source of chloride is domestic wastewater then chloride levels would be expected to plateau at that level. The source of chloride may be more complex however, chloride levels are increasing but simultaneously TDS levels have developed a slight decreasing trend. Assuming the only source is from effluent, this would suggest either chloride sources other than domestic are entering the system from as yet unidentified means, or that select ions are being scavenged out of the effluent in the soil column causing an increase in the chloride component at groundwater depth. Monitoring will continue in the proposed permit cycle. Magnesium, carbonate and sodium have also exhibited a slight increasing trend over time.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring schedule is detailed in the proposed permit under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual*.

Influent

Monitoring frequencies for pH and temperature will remain at twice per week because the data indicated little variability. BOD and TSS will continue to be monitored once per week to verify removal efficiencies. Ammonia will continue to be monitored three times per week as levels can vary by 100 percent between consecutive samples. Given that influent arises from a pressurized STEP system, it is in the best professional judgment of the Department that grab sampling is as representative as a 24-hour composite.

Chloride and TDS will be monitored to compare with groundwater data in order to better understand the increasing trend in chloride concentration found in the groundwater.

River Discharge

The 1997 amended ER recommended that monitoring for conductivity, alkalinity, hardness and total phosphorus be omitted from this permit; however, monitoring for alkalinity and hardness were retained. Monitoring for alkalinity is retained because its used to determine ammonia toxicity. Monitoring for hardness is retained, during the low flow months of September and October, to collect data for reasonable potential analysis for metals.

TKN is not required to be monitored in the proposed permit as well. Total reduced nitrogen levels can be estimated by multiplying the ammonia concentration by three. Furthermore, effluent ammonia is limited by the permit and is required to be monitored. Sampling of nitrate in the effluent is retained to monitor levels of oxidized nitrogen discharged to the river.

Phosphorous concentrations in the effluent discharged to the river have been monitored for a number of years. The level of phosphorous in the effluent is typical of domestic sewage with an average concentration of 4 mg/L total phosphorous. In light of the pending TMDL monitoring of phosphorous will be continued. Monitoring of groundwater phosphorous, the other source of phosphorous with the potential to reach the river, will continue to be monitored. Monthly

monitoring of sprayfield effluent for phosphorous will also be required to assess the efficiency of land treatment.

GROUND WATER

The monitoring of ground water at the site is required in accordance with the Ground Water Quality Standards, Chapter 173-200 WAC. The Department has determined that this discharge has a potential to pollute the ground water. Therefore the Permittee is required to evaluate the impacts on ground water quality. Monitoring of the ground water at the site boundaries and within the site is an integral component of such an evaluation. The sprayfield has three monitoring wells for this purpose. Monitoring Well #1 is upgradient of the wastewater sprayfield area. Monitoring Well #2, and the other well designated SW1 were installed inside the sprayfield area.

The monitoring schedule is detailed in the proposed permit under Special Condition S2.4. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

The monitoring frequency is the same as in the previous permit for NO_3-N, TDS, TRC, fecal coliform, pH, conductivity, and static water level in each well.

The monitoring frequency was reduced in the previous permit requirement from once per month to twice per year for sulfate, TKN, total iron, and manganese. The monitoring frequency for these will remain unchanged. Analysis of ground water monitoring data from the previous permit indicates that seasonal changes in these parameters will be adequately recognized at the proposed monitoring frequency.

The monitoring frequency, which was reduced from once per month to once per year for calcium, sodium, potassium, magnesium, total phosphorous, and alkalinity in the previous permit, will be increased to twice a year. Although these parameters are not regulated by the ground water quality standards, they are useful indicators of ground water quality impacts from sprayfield applications. Review of the ground water quality data from MW2 and SW1 shows that the concentration of most of these parameters is elevated above the concentration observed in the background monitoring well, MW1. This was not the case during the first two years of ground water monitoring. Two samples per year should be adequate to track these parameters.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* The laboratory at this facility is accredited for general chemistry and microbiological analysis.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The provisions of Special Condition S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in Special Condition S4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Special Condition S4. restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains Special Condition S5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

The Permittee has submitted an updated O & M manual for Department approval in November 2004. It is in the approval process at the time of this document was being written.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems the Permittee is required in Special Condition S6. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW and Chapter 173-308 WAC. The disposal of other solid waste is under the jurisdiction of the Chelan County Health Department.

This facility with the STEP System has a very low rate of sediment accretion at the treatment plant. Individual septic tanks, which are serviced by a licensed septic pumper, capture the bulk of the solids. The State anticipates requiring a general permit for solids disposal in the near future for facilities like the Permittee's, which generate solids over an extended period of time.

WASTEWATER PERMIT REQUIRED

RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

DUTY TO ENFORCE DISCHARGE PROHIBITIONS

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet.

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

GENERAL CONDITIONS

General Conditions are based directly on State and Federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended State or Federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for five (5) years.

REFERENCES FOR TEXT AND APPENDICES

Chelan County Public Utility District

July 2004. Lake Wenatchee Wastewater Treatment Plant Plan to Maintain Adequate Capacity

Chelan County Public Utility District

July 2004. Lake Wenatchee Sprayfield Management Plan.

Chelan County Public Utility District

February 1997. Lake Wenatchee Wastewater Treatment Plant Expansion Amendment to the Amended Engineering Report of February 1992

Chelan County Public Utility District

February 1991. Engineering Report for Lake Wenatchee Area Wastewater System

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A -- PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 15, 2004 in the Wenatchee World to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on January 26, 2005 in the Leavenworth Echo and the Cashmere Valley Record to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509/457-7105, or by writing to the address listed above.

This permit and fact sheet were written by Richard Marcley.

APPENDIX B -- GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the Federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

CBOD5 – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD5 is given in 40 CFR Part 136.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial User-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

Pass through -- A discharge which exits the POTW into waters of the-State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the State of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C -- TECHNICAL CALCULATIONS

REASONABLE POTENTIAL CALCULATIONS

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red

		State Water Quality Standard		Max concentration at edge of...		
Parameter	Ambient Concentration (metals as dissolved) *ug/L*	Acute *ug/L*	Chronic *ug/L*	Acute Mixing Zone *ug/L*	Chronic Mixing Zone *ug/L*	**LIMIT REQ'D?**
AMMONIA	260.0000	16100.0	2010.0	679.4	344	**NO**

Effluent percentile value	*Pn*	Max effluent conc. measured (metals as total recoverable) *ug/L*	Coeff Variation *CV*	*s*	# of samples *n*	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
0.95	0.050	3100.00	0.60	0.55	45	6.20	**43**	**214**

Mass Balance Dilution Factors
Critical River Flow = 184CFS

ACUTE DILUTION

eff flow	eff temp	rw flow	rw conc	**final conc**	**dil factor**
0.123	0	4.6	0	0.000	**38.39837**

CHRONIC DILUTION

eff flow	eff temp	rw flow	rw conc	**final conc**	**dil factor**
0.072	0	46	0	0.000	**639.8889**

RIVPLUM Mixing Zone Analysis

Spread of a plume from a point source in a river with boundary effects from the shoreline

based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.

Revised 22-Feb-96

	Side Discharge Scenario		**Outfall as reported in 1992 Eng. Report**	
	Chronic	**Acute**	**Chronic**	**Acute**
INPUT				
1. Effluent Discharge Rate (cfs):	0.072	0.123	0.072	0.123
2. Receiving Water Characteristics Downstream From Waste Input				
Stream Depth (ft):	1.25	1.25	1.25	1.25
Stream Velocity (fps):	1.22	1.22	1.22	1.22
Channel Width (ft):	120.00	120.00	120.00	120.00
Stream Slope (ft/ft) or Manning roughness "n":	0.045	0.045	0.045	0.045
0 if slope or 1 if Manning "n" in previous cell:	1	1	1	1
3. Discharge Distance From Nearest Shoreline (ft):	0	0	6.25	6.25
4. Location of Point of Interest to Estimate Dilution	5.00	50.00	5.00	50.00
Distance Downstream to Point of Interest (ft):	50	5	50	5
Distance From Nearest Shoreline (ft):	0	0	0	0
5. Transverse Mixing Coefficient Constant (usually 0.6):	0.6	0.6	0.6	0.6
6. Original Fischer Method (enter 0) or *Effective Origin* Modification (enter 1)	0	0	0	0
OUTPUT				
Unbounded Plume Width at Point of Interest (ft)	14.076	4.451	14.076	4.451
Unbounded Plume half-width (ft)	7.038	2.226	7.038	2.226
Distance from near shore to discharge point (ft)	0.00	0.00	6.25	6.25
Distance from far shore to discharge point (ft)	120.00	120.00	113.75	113.75
Plume width bounded by shoreline (ft)	7.04	2.23	13.29	4.45
Approximate Downstream Distance to Complete Mix (ft):	46,511	46,511	41,793	41,793
Theoretical Dilution Factor at Complete Mix:	2,541.7	1,487.8	2,541.7	1,487.8
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	149.073	27.595	281.452	55.190
Calculated Dilution Factor at Point of Interest:	**93.4**	**17.3**	**452.2**	**122,243,486.4**

pH and Temperature modeling at edge of the acute mixing zone

procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Based on Lotus File PHMIX2.WK1 Revised 19-Oct-93

INPUT	
1. DILUTION FACTOR AT ACUTE MIXING ZONE BOUNDARY	43.000
1. UPSTREAM/BACKGROUND CHARACTERISTICS	
Temperature (deg C):	10.00
pH:	7.29
Alkalinity (mg CaCO3/L):	16.00
2. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	11.30
pH:	6.69
Alkalinity (mg CaCO3/L):	64.70
OUTPUT	
1. IONIZATION CONSTANTS	
Upstream/Background pKa:	6.46
Effluent pKa:	6.45
2. IONIZATION FRACTIONS	
Upstream/Background Ionization Fraction:	0.87
Effluent Ionization Fraction:	0.63
3. TOTAL INORGANIC CARBON	
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	18.39
Effluent Total Inorganic Carbon (mg CaCO3/L):	102.10
4. CONDITIONS AT MIXING ZONE BOUNDARY	
Temperature (deg C):	10.03
Alkalinity (mg CaCO3/L):	17.13
Total Inorganic Carbon (mg CaCO3/L):	20.34
pKa:	6.46
pH at Mixing Zone Boundary:	7.19

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at http://www.ecy.wa.gov/programs/wq/wastewater/index.html

VISUAL PLUMES Dilution Models

```
/ UM3. 11/24/2004 9:16:27 AM
Case 1; ambient file c:\plumes\VP plume 20.001.db; Diffuser table record 1: ----------------------------------

Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-sal   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.372       0.0     0.001       5.0       0.0    0.0001      1.22       0.0    0.0001    0.0311
      1.25     0.366       0.0     0.001       5.0       0.0    0.0001      1.22       0.0    0.0001    0.0311

Diffuser table:
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft) (ft3/s)   (psu)     (C) (kg/kg)
     6.0     0.0     0.0    90.0     1.0     5.0    50.0    1.25  0.0893 1.00E-3    11.0      0.0

Simulation:
Froude number:      5.973; effluent density (sigma-T)  -0.3291232; effluent velocity     0.139(m/s);
        Depth  Amb-cur    P-dia  Polutnt   Dilutn   x-posn   y-posn
Step     (ft)   (ft/s)     (in)  (kg/kg)       ()     (ft)     (ft)
   0     1.25    1.214      6.0      0.0      1.0      0.0      0.0;
   1     1.25    1.214     6.01      0.0    1.003 2.345E-5  0.00262; bottom hit, begin overlap;
  98    1.249    1.214    7.163      0.0    2.034    0.195     0.17; end overlap;
 100    1.249    1.214    7.192      0.0    2.097    0.207    0.175;
 195     1.24    1.214     14.1      0.0    13.64    5.034    0.485; acute zone;
 200    1.239    1.214    14.76      0.0    15.06    5.896    0.509;
 267     1.16    1.214    27.92      0.0    56.75     46.7    0.972; surface;
```

CORMIX ACUTE AND CHRONIC DILUTION MODEL

```
                    CORMIX MIXING ZONE EXPERT SYSTEM
                        CORMIX-GI Version 4.2E
                     HYDRO1:Version-4.2  August,2002
SITE NAME/LABEL:
  DESIGN CASE:
  FILE NAME:                      UNSET.prd
Using subsystem CORMIX1:          Submerged Single Port Discharges
  Start of session:               11/17/2004--11:59:42
*****************************************************************
SUMMARY OF INPUT DATA:
-----------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                           = bounded
  Width                          BS       = 36.58 m
  Channel regularity             ICHREG   = 1
  Ambient flowrate               QA       = 5.18 m^3/s
  Average depth                  HA       = 0.38 m
  Depth at discharge             HD       = 0.38 m
  Ambient velocity               UA       = 0.3719 m/s
  Darcy-Weisbach friction factor F        = 0.2191
    Calculated from Manning's n           = 0.045
  Wind velocity                  UW       = 1 m/s
Stratification Type              STRCND   = U
  Surface temperature                     = 5
 degC
  Bottom temperature                      = 5 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density                RHOAS    = 999.9667 kg/m^3
  Bottom density                 RHOAB    = 999.9667 kg/m^3
-----------------------------------------------------------------
```

```
DISCHARGE PARAMETERS:              Submerged Single Port Discharge
  Nearest bank                             = left
  Distance to bank                 DISTB   = 1.91 m
  Port diameter                    DO      = 0.1219 m
  Port cross-sectional area        AO      = 0.0117 m^2
  Discharge velocity               UO      = 0.30 m/s
  Discharge flowrate               QO      = 0.003483 m^3/s
  Discharge port height            HO      = 0.08 m
  Vertical discharge angle         THETA   = 0 deg
  Horizontal discharge angle       SIGMA   = 180 deg
  Discharge temperature (freshwater)       = 11 degC
    Corresponding density          RHOO    = 999.6072 kg/m^3
  Density difference               DRHO    = 0.3596 kg/m^3
  Buoyant acceleration             GPO     = 0.0035 m/s^2
  Discharge concentration          CO      = 0.000001 mg/l
  Surface heat exchange coeff.     KS      = 0 m/s
  Coefficient of decay             KD      = 0 /s
------------------------------------------------------------------------
********** REGULATORY MIXING ZONE SUMMARY **********
The plume conditions at the boundary of the specified RMZ are as follows:
  Pollutant concentration                  = 0  mg/l
Corresponding dilution                     = 43.0
  Plume location:                      x = 9.14 m
    (centerline coordinates)           y = 0 m
                                       z = 0 m
  Plume dimensions:              half-width = 0.67 m
                                  thickness = 0.38 m
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                        CORMIX MIXING ZONE EXPERT SYSTEM
                            CORMIX-GI Version 4.2E
                         HYDRO1:Version-4.2  August,2002
SITE NAME/LABEL:
  DESIGN CASE:
  FILE NAME:                       UNSET.prd
Using subsystem CORMIX1:           Submerged Single Port Discharges
  Start of session:                11/17/2004--12:03:57
************************************************************************
SUMMARY OF INPUT DATA:
------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                            = bounded
  Width                            BS      = 36.58 m
  Channel regularity               ICHREG  = 1
  Ambient flowrate                 QA      = 5.18 m^3/s
  Average depth                    HA      = 0.38 m
  Depth at discharge               HD      = 0.38 m
  Ambient velocity                 UA      = 0.3719 m/s
  Darcy-Weisbach friction factor   F       = 0.2191
    Calculated from Manning's n            = 0.045
  Wind velocity                    UW      = 1 m/s
Stratification Type                STRCND  = U
  Surface temperature                      = 5
 degC
  Bottom temperature                       = 5 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density                  RHOAS   = 999.9667 kg/m^3
  Bottom density                   RHOAB   = 999.9667 kg/m^3
```

```
DISCHARGE PARAMETERS:              Submerged Single Port Discharge
  Nearest bank                            = left
  Distance to bank                 DISTB  = 1.91 m
  Port diameter                    DO     = 0.1219 m
  Port cross-sectional area        AO     = 0.0117 m^2
  Discharge velocity               UO     = 0.17 m/s
  Discharge flowrate               QO     = 0.002039 m^3/s
  Discharge port height            HO     = 0.08 m
  Vertical discharge angle         THETA  = 0 deg
  Horizontal discharge angle       SIGMA  = 180 deg
  Discharge temperature (freshwater)      = 11 degC
    Corresponding density          RHOO   = 999.6072 kg/m^3
  Density difference               DRHO   = 0.3596 kg/m^3
  Buoyant acceleration             GPO    = 0.0035 m/s^2
  Discharge concentration          CO     = 0.000001 mg/l
  Surface heat exchange coeff.     KS     = 0 m/s
  Coefficient of decay             KD     = 0 /s
-------------------------------------------------------------------------

********************** REGULATORY MIXING ZONE SUMMARY ***********************
The plume conditions at the boundary of the specified RMZ are as follows:
  Pollutant concentration                 = 0  mg/l
Corresponding dilution                    = 214.3
  Plume location:                      x = 91.44 m
    (centerline coordinates)           y = 1.91 m
                                       z = 0 m
  Plume dimensions:              half-width = 3.93 m
                                  thickness = 0.38 m
```

APPENDIX D -- RESPONSE TO COMMENTS

No comments were received by the Department of Ecology.